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NERC SCIENCE OF THE ENVIRONMENT

Read and Write Data

ncgen and ncdump to create/export NetCDF and CDL

Thanks to all contributors:

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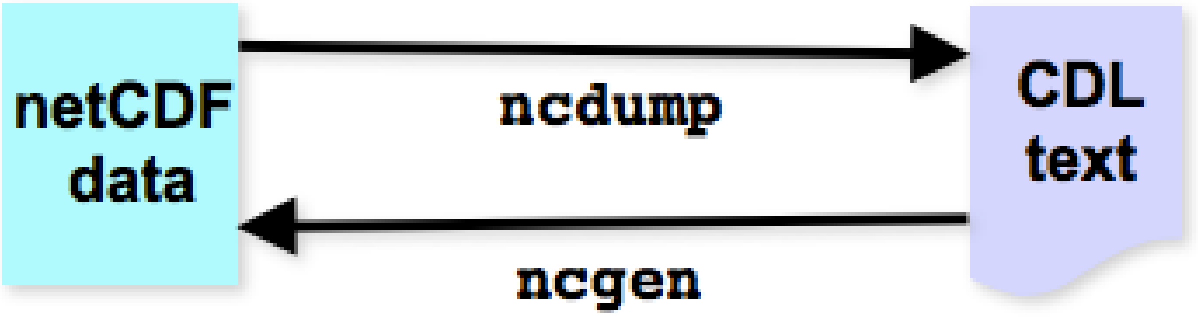
ncdump and ncgen

Used together, **ncdump** and **ncgen** can accomplish simple netCDF manipulations with little or no programming.

ncdump and **ncgen** are reverse operations:



CDL (network Common Data form Language)

CDL provides a means for NetCDF ↔ ASCII translation. It is a simple text-based language that can be directly converted to NetCDF.

It has two main utilities:

1. `ncdump` (from NetCDF to ASCII)
   - to get overview of NetCDF file contents
2. `ncgen` (from ASCII to NetCDF)
   - to create NetCDF files

ncdump

For quick glimpse at file's "metadata"

- To view header info:

```
ncdump -h myfile.nc
```

- To view header info plus values of coordinate variables:

```
ncdump -c myfile.nc
```

- To output data values in ascii form:

```
ncdump –v varname myfile.nc
```

An easy way to view NetCDF: CDL

CDL is a human-readable notation for netCDF objects and data.

```
netcdf  example { // example of CDL notation
dimensions:
    lon = 3 ;
    lat = 8 ;
variables:
    float rh(lon, lat) ;
        rh:units = "percent" ;
        rh:long_name = "Relative humidity" ;
// global attributes
        :title = "Simple example, lacks some conventions" ;
data:
  rh =
    2, 3, 5, 7, 11, 13, 17, 19,
    23, 29, 31, 37, 41, 43, 47,
    53, 59, 61, 67, 71, 73, 79, 83, 89 ;
}
```

Let's zoom in...

```
netcdf  example { // example of CDL notation
dimensions:
   lon = 3 ;
   lat = 8 ;

variables:
   float rh(lon, lat) ;
      rh:units = "percent" ;
      rh:long_name = "Relative humidity" ;

// global attributes
      :title = "Simple example, lacks some
conventions" ;

data:
  rh =
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    23, 29, 31, 37, 41, 43, 47,
    53, 59, 61, 67, 71, 73, 79, 83, 89 ;
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```
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    23, 29, 31, 37, 41, 43, 47,
    53, 59, 61, 67, 71, 73, 79, 83, 89 ;
}
```

This example specifies a netCDF dataset with:

- 2 dimensions (**lon** and **lat**)
- 1 variable (**rh**)
- 2 variable attributes (**units** and **long_name**)
- 1 global attribute (**title**), and 24 data values for the variable.

NCL example: explained

- Only one variable, but multiple variables are allowed.
- CDL comments follow "//" symbols. They are not part of netCDF data and will not be recorded in a transformation.

- You can use the **ncdump** utility to get the CDL form of a binary netCDF file.
- You can use the **ncgen** utility to generate a binary netCDF file from CDL.
- This simple example neglects some recommended best practices for netCDF data.

Writing a NetCDF file with ncgen

ncgen can be used to:

- Generate a NetCDF file

```
ncgen -o mydata.nc mydata.cdl
```

- Generate code that will produce a NetCDF file
    - Fortran:

    ```
    ncgen -f mydata.cdl > mydata.f
    ```

    - C:

    ```
    ncgen -c mydata.cdl > mydata.c
    ```

Further information

- NetCDF:

  https://www.unidata.ucar.edu/software/netcdf/

- CDL:

  https://docs.unidata.ucar.edu/nug/current/_c_d_l.html

- Best practices to writing NetCDF files:

  https://www.unidata.ucar.edu/software/netcdf/workshops/2010/bestpractices